



SPIRE Photometer Products and the Product Access Layer

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and the SPIRE ICC





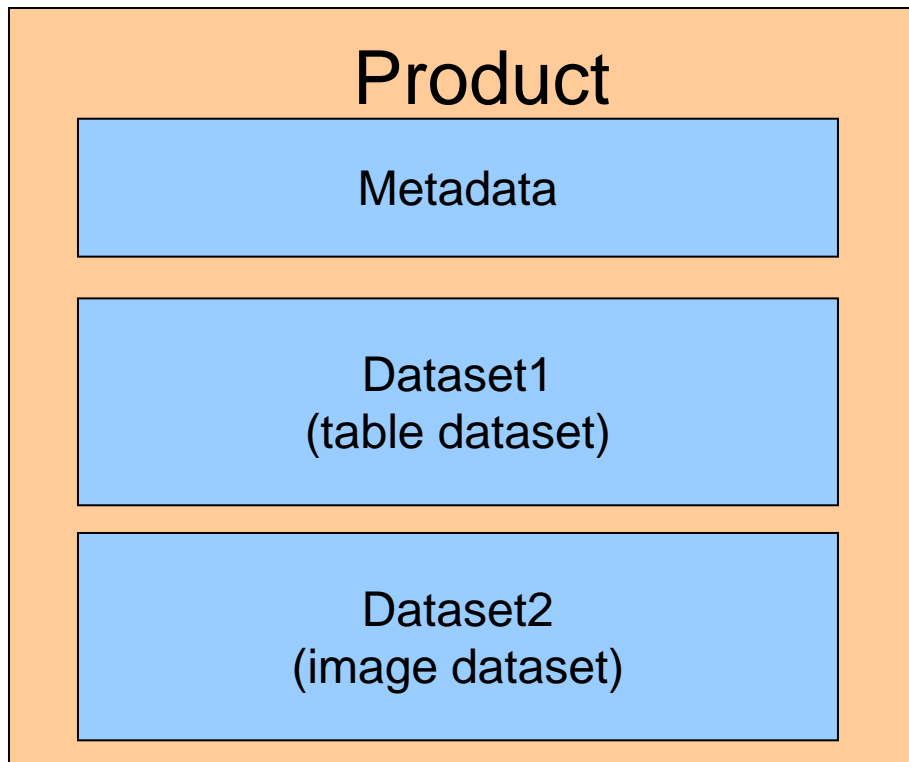
Additional Material

- Script to print Level 0.5 building blocks
- Script to demonstrate reducing disk space usage
 - Script reduces scan map and saves Level 1 in Level 1 only pool and saves maps only as FITS files
- Download from SPIRE_PHOT/SCRIPTS
 - SPIRE_PrintLevel05Blocks.py
 - SPIRE_ScanMapReductionL1poolVariant.py
- Video showing HIPE archive access
- Video showing importing and exporting HIPE data
 - Importing HSA export directory structure into HIPE and looking at a SPIRE scan map
 - Exporting data to an export directory structure
- Download from “SDP_DP_WS_Dec2009/VIDEOS/”
 - HipelImportExport.mov
 - HSAquery03.mov



General Product Structure

- Products are containers for datasets that can be stored within the HCSS system.
- A product can be exported to other software using a FITS representation.

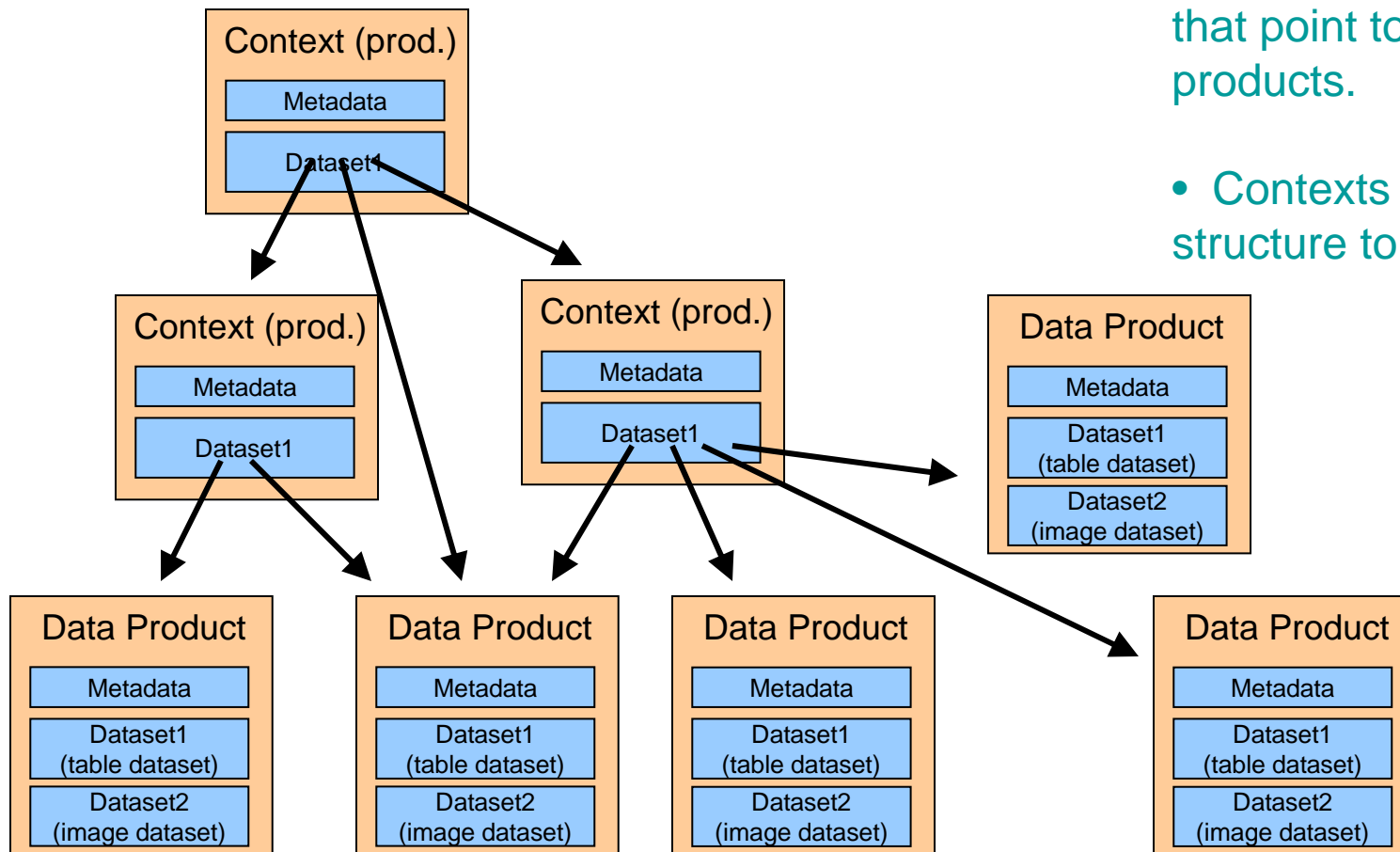


- Products contain:
 - Metadata,
 - Datasets
 - Processing history
- Types of datasets are:
 - Array dataset
 - Table dataset
 - Composite dataset
 - Spectrum1d
 - Spectrum2d
- Generic Product Types are:
 - SimpleImage
 - SimpleCube
 - SpectralSimpleCube
 - Context



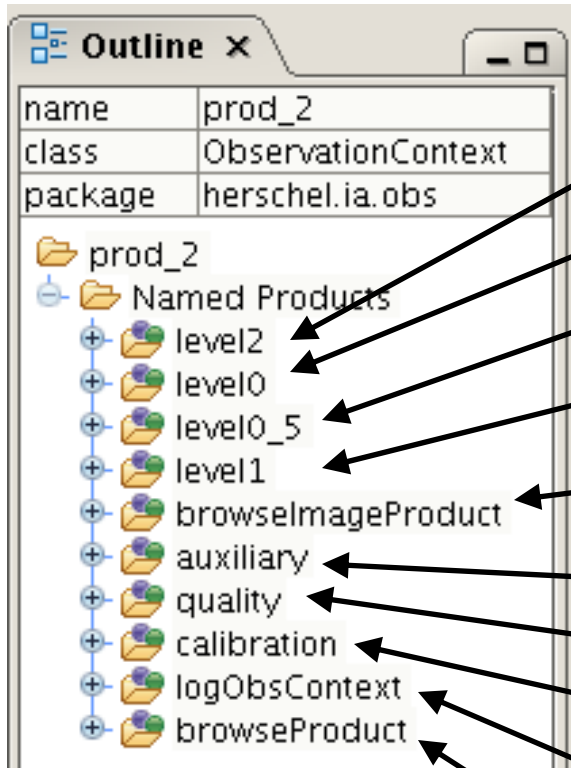
Contexts

- Contexts are products that point to other products.
- Contexts provide structure to the data.





A SPIRE Observation In HIPE



These are all contexts!

Level 2 Highest proc., images, PSF fit results

Level 0: Raw unprocessed reformatted data

Level 0.5: Data converted to engineering units

Level 1: Calibrated fluxes in timelines

Browse image product: Simple representation of final map

Auxiliary data: Pointing, orbit data, uplink info, etc...

Quality control data: Tells whether things went O.K.

Calibration data: Products used for processing

Reduction Log: Data reduction history

Browse product: Another browse product



Contexts inside Contexts (Peeling the Onion...further)

Calibration Products

- Associated Products
 - Named Products
 - ChanMaskList
 - ElecCross
 - ChanTimeOff
 - OptCross
 - BsmOpsList
 - LpfPar
 - PcalList
 - ChanGain
 - FluxConv
 - OffsetHist
 - ChanTimeConst
 - BsmPos
 - DetAngOff
 - Flat
 - ChanNum
 - TempDriftCorr
 - BolPar

Auxiliary Products

- Associated Products
 - Named Products
 - SremCalProduct
 - UplinkProduct
 - SremRawProduct
 - TimeCorr
 - Pointing
 - Siam
 - OrbitEphemeris
 - MissingTm
 - OOL
 - TeleCommandHistory

Level 2 Products

- Associated Products
 - Named Products
 - PSW
 - class: herschel.ia.dataset.image.SimpleImage
 - urn:productdemo1:herschel.ia.dataset.image.SimpleImage:3
 - meta (load)
 - product (load)
 - PMW
 - PLW

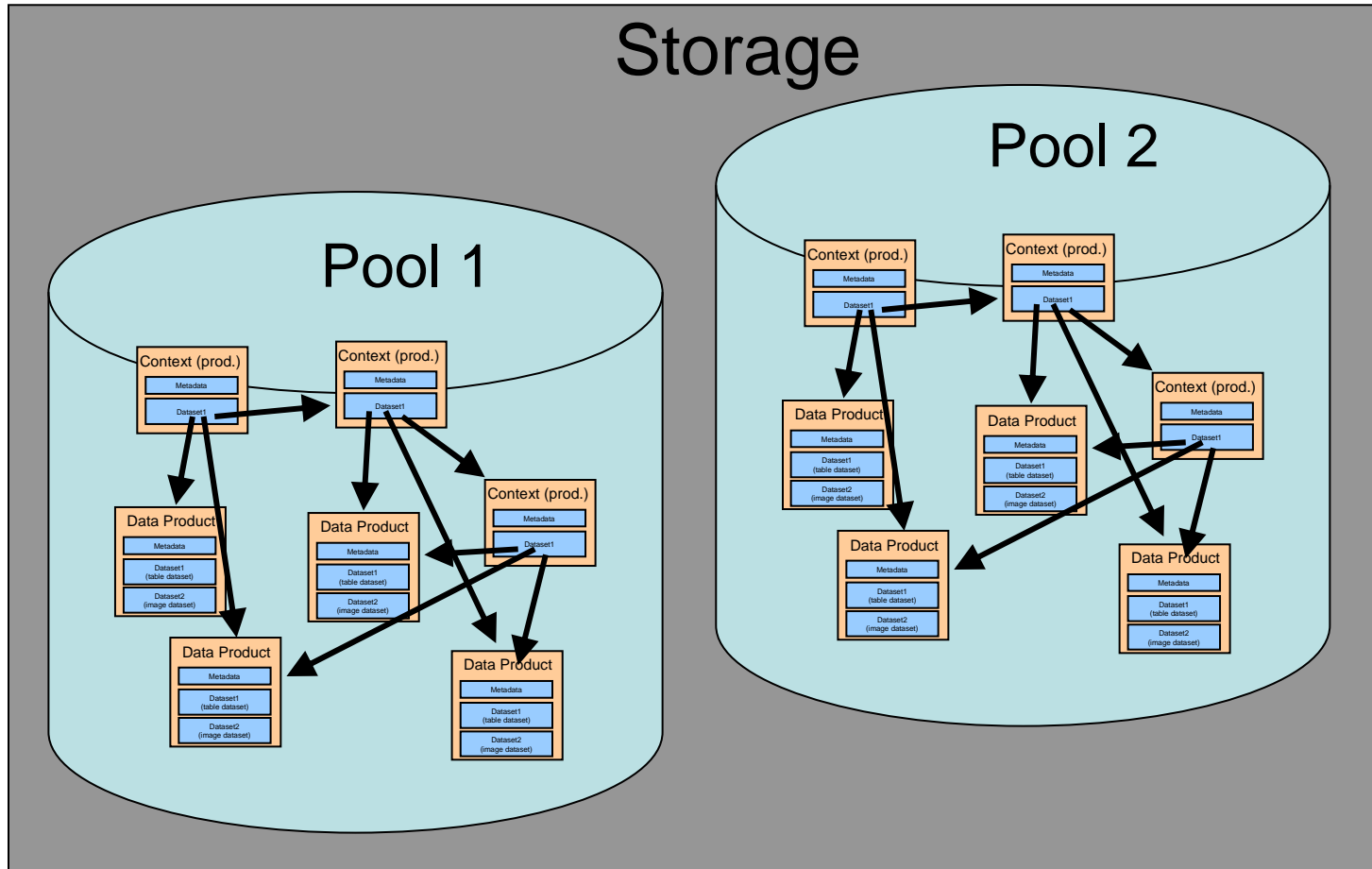
Observation Reduction Log

Meta Data	
None	
Array Data	
ArrayData: String1d	
String1d: data[0:26]	
0	
Mon, 15 Dec 2008 17:15:00.390 +0100: Updated Observation Identifier	
Mon, 15 Dec 2008 17:15:00.461 +0100: Updated Operational Day Number	
Mon, 15 Dec 2008 17:15:50.913 +0100: Updated Auxiliary Context	
Mon, 15 Dec 2008 17:15:50.913 +0100: Removed Dataframes Context	
Mon, 15 Dec 2008 17:15:50.913 +0100: Removed Level 0 Product	
Mon, 15 Dec 2008 17:15:50.913 +0100: Removed Level 0.5 Product	
Mon, 15 Dec 2008 17:15:50.913 +0100: Removed Level 1 Product	
Mon, 15 Dec 2008 17:15:50.913 +0100: Removed Level 2 Product	
Mon, 15 Dec 2008 17:16:02.676 +0100: Updated Calibration Context	
Mon, 15 Dec 2008 17:16:02.676 +0100: Removed Level 0 Product	
Mon, 15 Dec 2008 17:16:02.676 +0100: Removed Level 0.5 Product	
Mon, 15 Dec 2008 17:16:02.676 +0100: Removed Level 1 Product	
Mon, 15 Dec 2008 17:16:02.676 +0100: Removed Level 2 Product	
Mon, 15 Dec 2008 17:18:07.549 +0100: Updated Level 0 Product	
Mon, 15 Dec 2008 17:18:07.549 +0100: Removed Level 1 Product	
Mon, 15 Dec 2008 17:18:07.549 +0100: Removed Level 2 Product	
Mon, 15 Dec 2008 17:22:23.673 +0100: Updated Level 0.5 Product	
Mon, 15 Dec 2008 17:22:23.673 +0100: Removed Level 1 Product	
Mon, 15 Dec 2008 17:22:23.673 +0100: Removed Level 2 Product	
ri, 6 Mar 2009 12:32:20.737 -0800: Updated Level 0.5 Product	
ri, 6 Mar 2009 12:32:20.738 -0800: Removed Level 1 Product	
ri, 6 Mar 2009 12:32:20.738 -0800: Removed Level 2 Product	
ri, 6 Mar 2009 12:45:42.291 -0800: Updated Level 1 Product	
ri, 6 Mar 2009 12:45:42.291 -0800: Removed Level 2 Product	
ri, 6 Mar 2009 12:47:48.804 -0800: Updated Level 2 Product	

Only one product of these is not a context

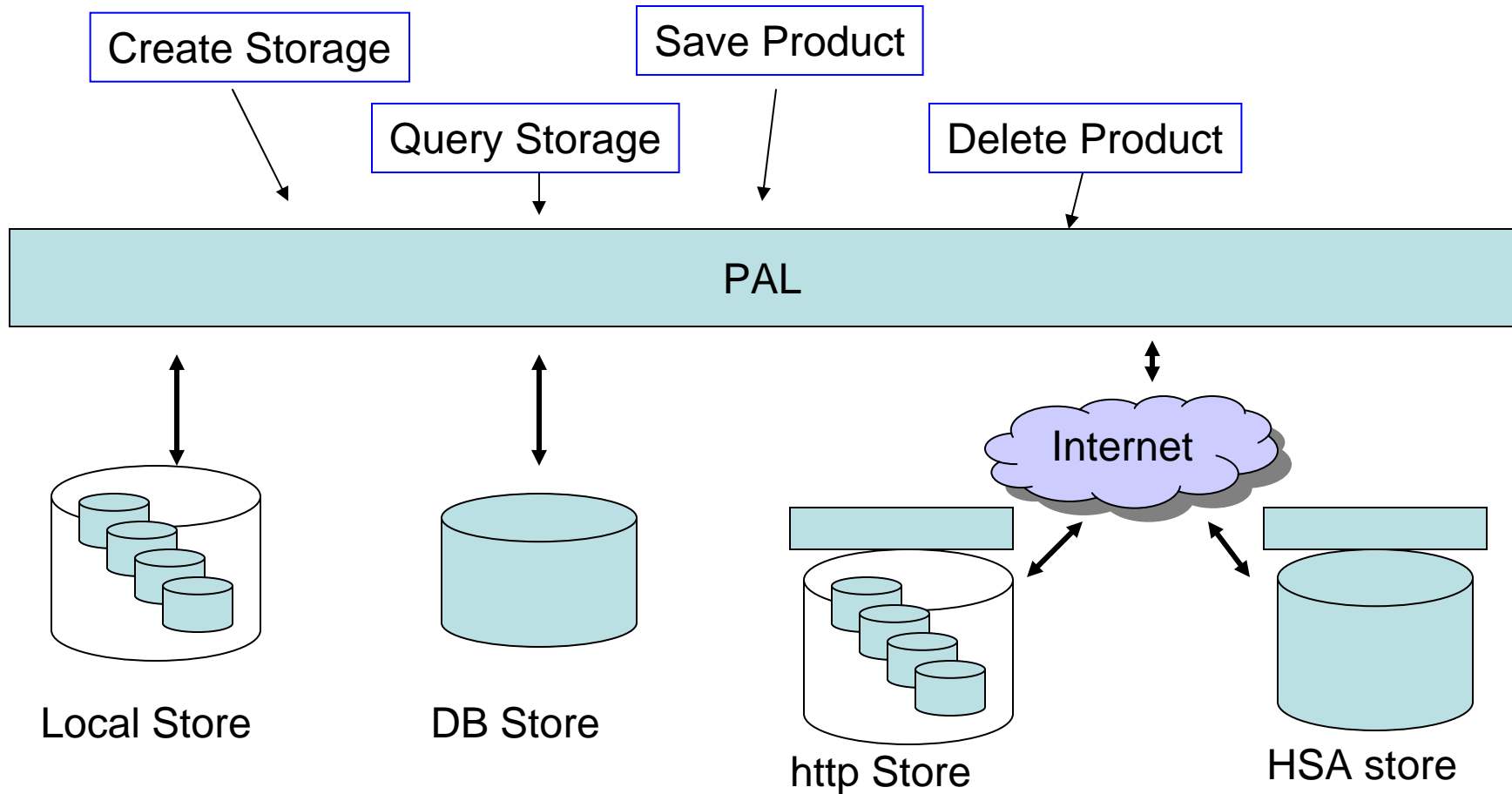


Pools and Storage



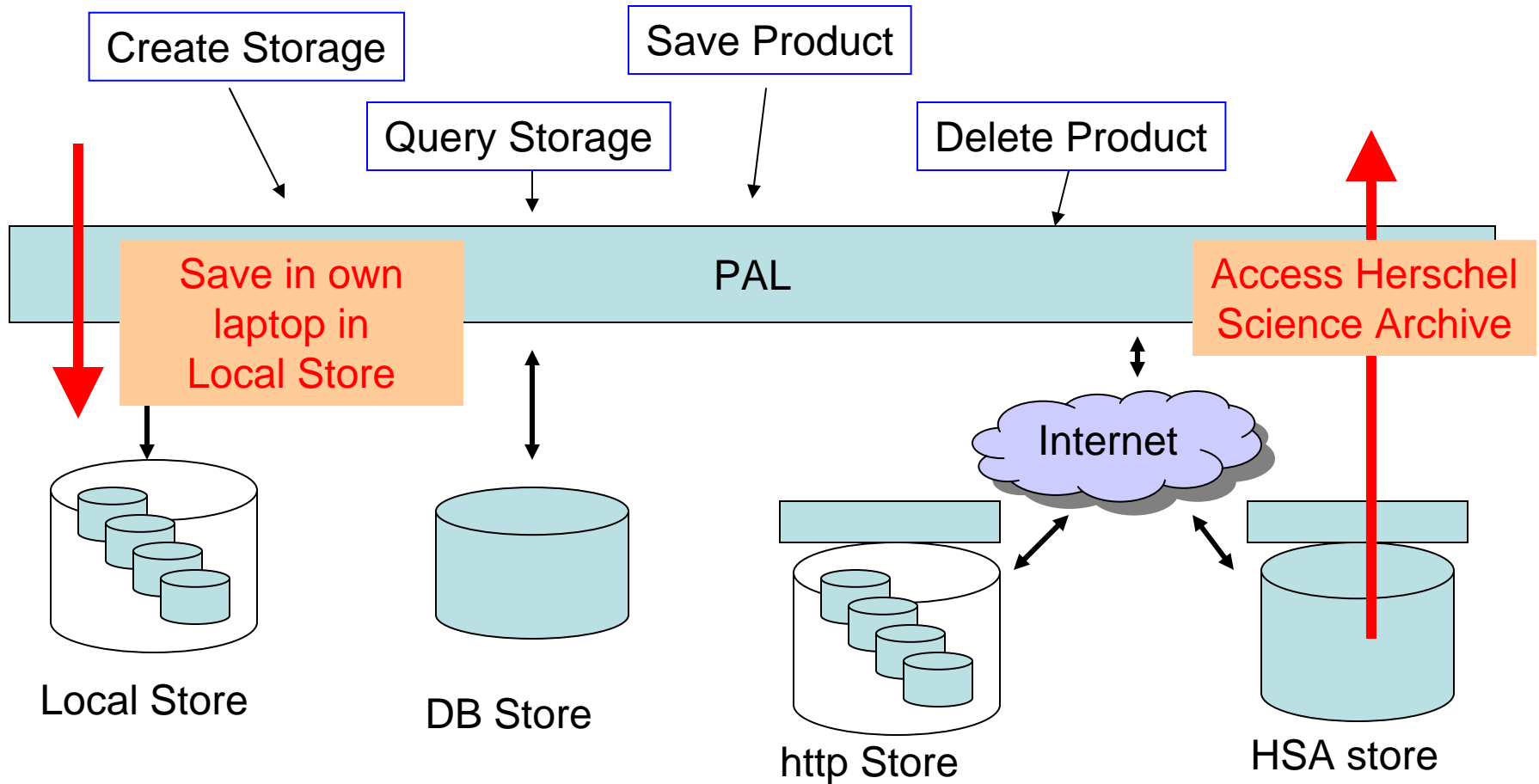


The Product Access Layer



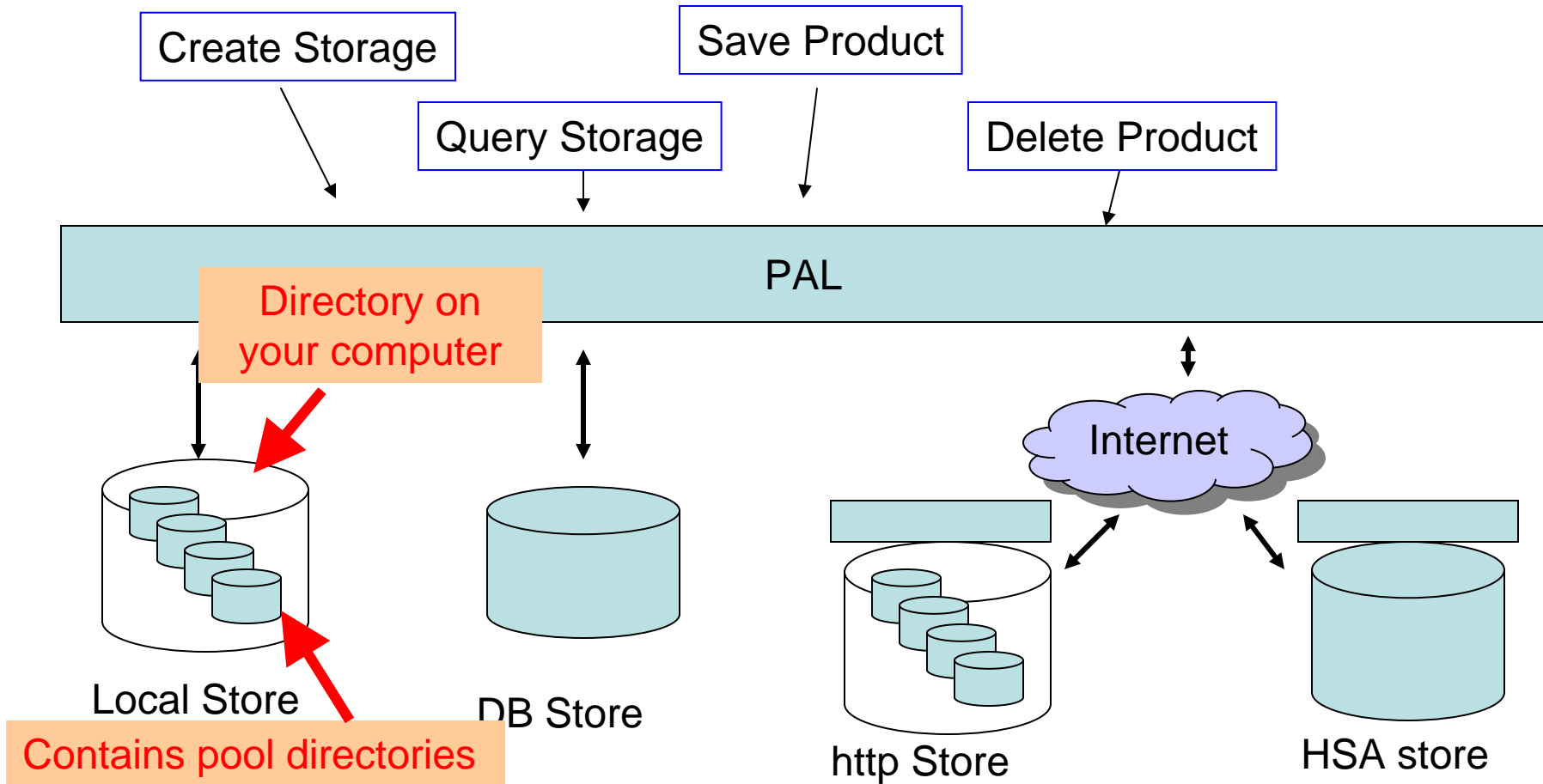


The Product Access Layer



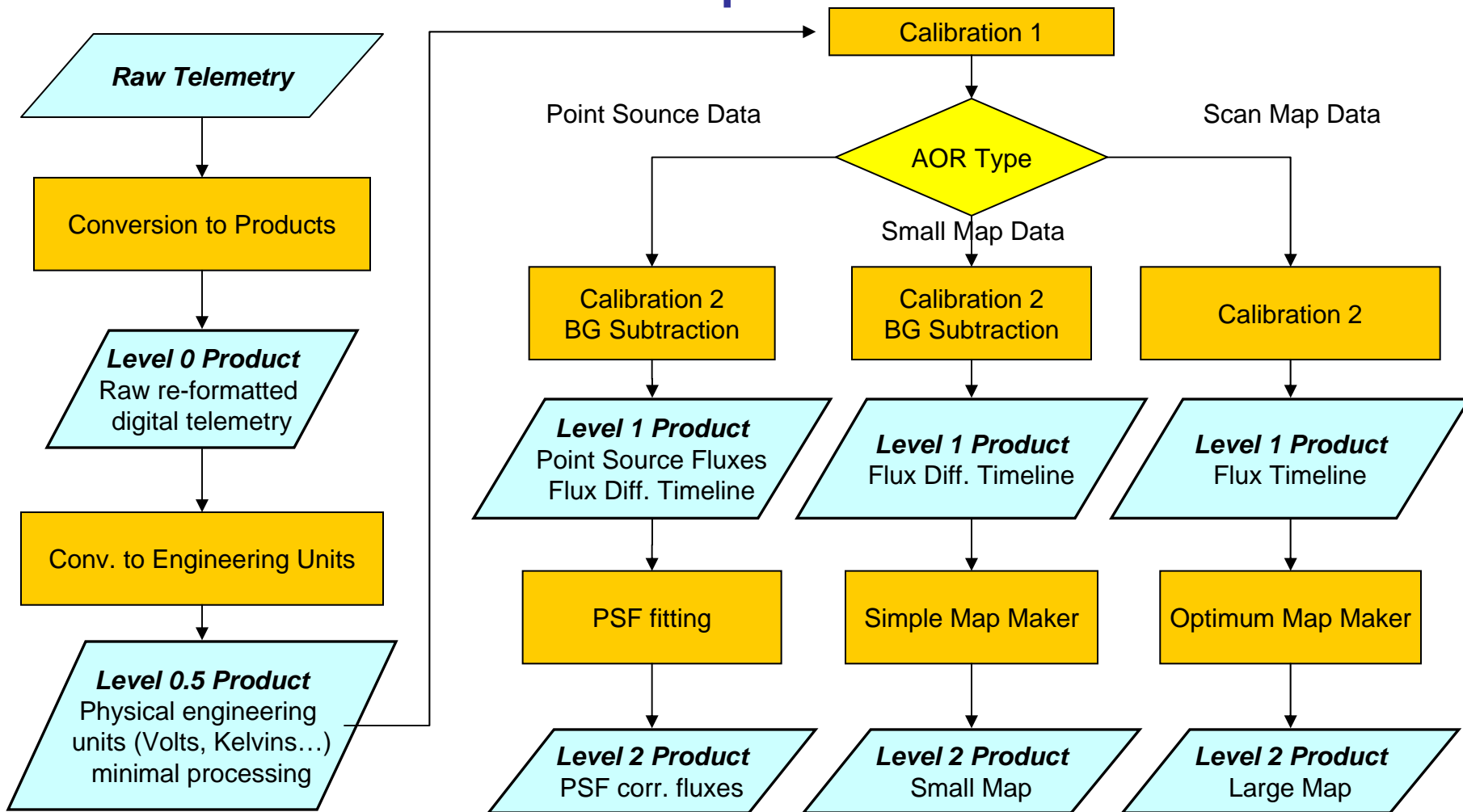


The Product Access Layer





Photometer Pipeline Structure





Level 2 Scan map in Standard Image Viewer

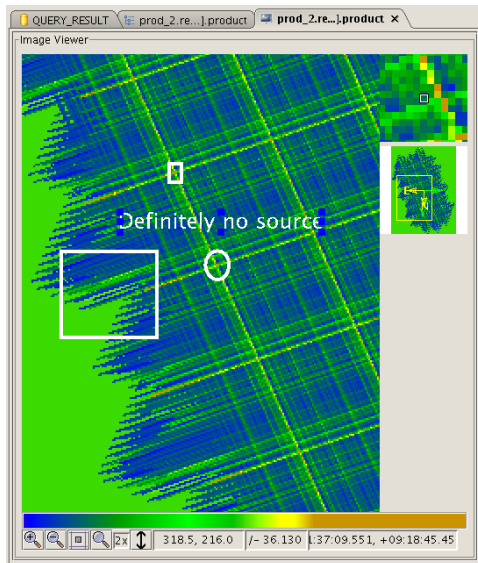
Associated Products

- Named Products
 - PSW
 - class: herchel.ia.dataset.image.SimpleImage
 - urn:productdemo1:herchel.ia.dataset.image.SimpleImage:3
 - meta (load)
 - product (load)
 - PMW
 - PLW

double click



analysis





Elements of a Level 2 Map (Small & Scan)

PSW map

PSW map

Meta Data			
name	value	unit	description
type	PMP		Product Type Identification
creator	naiveScanMapper		Generator of this product
creationDate	2009-03-06T20:46:4...		Creation date of this product
description	PSW map		Name of this product
instrument	SPIRE		Instrument attached to this product
modelName	FLIGHT		Model name attached to this product
startDate	2009-03-06T20:29:2...		Start date of this product
endDate	2009-03-06T20:29:2...		End date of this product
wavelength	250.0	µm	The reference wavelength at which the image is t...
aorLabel	Calibration_sovt2_od6...		
aot	Photometer		
author	SPG		
cusMode	SpirePhotoLargeScan		
dec	0.0	*	Actual Declination of pointing
decNominal	0.0	*	Requested Declination of pointing
equinox	2000.0		Equinox of celestial coordinate system
instMode	POF5		
fileName	Unknown		Name of exported file
missionCode	SOVT2_C		
naifid	Unknown		SSO NAIF identifier
object	CRL 2688		
observer	pvspire		
obsid	3221226247		
obsMode	Mode: large		
odNumber	60		
pointingM...	Cross_scan		
posAngle	0.0		Position Angle of po...
proposal	Calibration_pvspire_2		
ra	0.0	*	Actual Right Ascens...
raDeSys	FK5		
raNominal	0.0	*	Requested Right As...
telescope	Herschel		Name of telescope
isFailedPSW	false		Flag indicating that

Metadata

Image Dataset

Image

Meta Data			
name	value	unit	description
crval1	174.3978825680984		WCS: First coordinate of reference pixel
crval2	8.850151171595417		WCS: Second coordinate of reference pixel
cdelt1	-0.0016666666666667		WCS: Pixel scale axis 1, unit=Angle
cdelt2	0.0016666666666667		WCS: Pixel scale axis 2, unit=Angle
ctype1	RA--TAN		WCS: Projection type axis 1, default="LINEAR"
ctype2	DEC--TAN		WCS: Projection type axis 2, default="LINEAR"
epoch	2000.0		WCS: Epoch, unit=Duration
crota2	0.0		The Rotation angle
crpix1	153.0		WCS: Reference pixel position axis 1, unit=Scalar
crpix2	42.0		WCS: Reference pixel position axis 2, unit=Scalar

Array Data

ArrayData: Double2d

Double2d: data[0:509][0:376]

21	22	23	24	25	26	...
1234...	NaN	NaN	17.44484...	28.27814...	39.09887...	16.8
3410...	21.30007...	NaN	NaN	17.44393...	39.07477...	16.8
6300...	21.30901...	12.57653...	NaN	17.46394...	33.69367...	27.9
8341...	23.75509...	21.28867...	12.55207...	NaN	17.46631...	39.0
	28.67735...	21.30669...	12.56764...	NaN	17.47265...	39.0
	28.65869...	21.32441...	16.92562...	12.56419...	NaN	17.4
	NaN	28.67733...	21.29562...	12.57598...	NaN	17.4
	NaN	28.65326...	21.30243...	14.75816...	21.08985...	23.3
0443...	NaN	28.66452...	28.65270...	21.29220...	12.58228...	25.3
0747...	NaN	NaN	28.64022...	21.30398...	12.55726...	21.1
3627...	NaN	NaN	28.66561...	28.68114...	21.29962...	12.0
2376...	21.91649...	NaN	NaN	28.66140...	21.31534...	12.0
5473...	21.92537...	NaN	NaN	28.65481...	24.99753...	21.2
2488...	17.46993...	21.94300...	NaN	NaN	28.67489...	21.3
	15.23499...	21.92922...	NaN	NaN	28.65657...	23.7
	15.23315...	19.68313...	21.93531...	15.83809...	15.84114...	22.2
	NaN	15.23458...	21.93547...	NaN	NaN	28.6
	NaN	15.24148...	21.89950...	21.96040...	NaN	NaN
	NaN	NaN	15.23131...	21.90479...	NaN	NaN
	NaN	NaN	15.24253...	20.84786...	18.68050...	18.6
	NaN	18.66794...	18.09788...	16.60567...	21.92135...	NaN
	NaN	NaN	NaN	15.24742...	21.92484...	NaN
	NaN	NaN	NaN	15.23552...	16.91514...	21.9
	NaN	NaN	NaN	NaN	18.25347...	21.6
	NaN	21.26887...	21.27339...	21.28691...	59.12980...	60.8

Data Sets

- Datasets
 - image
 - error
 - exposure
 - History
 - HistoryScript
 - HistoryTasks
 - HistoryParameters



Level 2 Point Source Photometry

Metadata

raDeSys	J2000	Coordinate reference frame for the
raNominal	0.0	Requested Right Ascension of pointi
telescope	Herschel Space Obser...	Name of telescope
subsystem	PHOTOMETER	Instrument subsystem
denodDropp...	0	Number of pixel/jiggle position whe
wcsType	EQUATORIAL	Type of Coordinate System
wcsReference	ICRS	Reference of Coordinate System
bbid	-1	Building Block Identifier
source	PHOTF	TM source packet name
biasFreq	0.0	Hz Bias frequency
rasterId	0	Raster id
OpticalCross...	true	
denodGlitch...	0	
denodGlitch...	0.0	
nFitsPSW	76	
nFitsPMW	73	
nFitsPLW	32	
fluxDiffPsw	148.49887523784287	
fluxDiffPmw	252.12957606811256	
fluxDiffPlw	40.70866412354874	
latDiffPswPmw	NaN	
lonDiffPswPmw	NaN	
latDiffPswPlw	NaN	
lonDiffPswPlw	NaN	
latDiffPmwPlw	NaN	
lonDiffPmwPlw	NaN	

Datasets

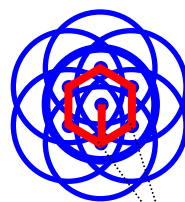
- Data Sets
 - Datasets
 - outputDataset
 - History
 - HistoryScript
 - HistoryTasks
 - HistoryParameters

Contents

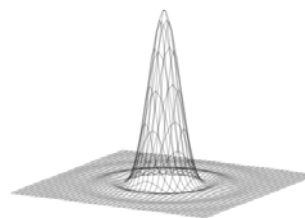
- Meta Data
- None
- Table Data
 - TableDataset

Index	arrayName	lon	errLon	lat	errLat	sig
0	PSW	0.0	0.0	0.0	0.0	0.001
1	PMW	0.0	0.0	0.0	0.0	-0.00
2	PLW	0.0	0.0	0.0	0.0	0.033

7 point jiggle
(point source)



single step
~ 6"



signal	error
0.001182...	0.0
-0.00250...	0.0
0.033397...	0.0

Flux differences
for each band
from PSF fit



Homework

- Script to print Level 0.5 building blocks
- Script to demonstrate reducing disk space usage
 - Script reduces scan map and saves Level 1 in Level 1 only pool and saves maps only as FITS files
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 - Exporting data to an export directory structure
- Download from “SDP_DP_WS_Dec2009/VIDEOS/”
 - HipelImportExport.mov
 - HSAquery03.mov

